

REMARKS

In view of the above amendments and following remarks, reconsideration and further examination are requested.

In response to the Final Rejection mailed October 23, 2002, the following new title is provided --Motor Shaft Caulked Within Groove Of Eccentric Load--.

With regard to the 35 U.S.C. 112, first paragraph, rejection, the substitute specification has been amended at pages 11 and 18 in accordance with the personal interview conducted on December 19, 2002.

With regard to the substitute specification not being entered because it does not include a statement as to a lack of new matter, please see page 9, lines 6-7 of the Response filed August 8, 2002, which expresses that no new matter has been added by the substitute specification. Accordingly, entry of the substitute specification is hereby requested.

And, with regard to the prior art rejections, claims 9, 10, 13, 16 and 18 have been amended in accordance with the personal interview conducted on December 19, 2002. And, claims 12 and 21-28 have been cancelled.

The courtesies extended by Examiner Elkassabgi and Examiner Tamai during the personnel interview conducted on December 19, 2002 are greatly appreciated. During the interview, the 35 U.S.C. 112, first paragraph, rejections were discussed, as were the prior art rejections.

During the interview it was agreed that the 35 U.S.C. 112, first paragraph, rejections could be overcome by amending the specification so as to describe features and structure of the instant invention with the same terminology as used in the claims. Accordingly, the substitute specification has been amended at page 11 and page 18 to describe the invention with terminology used in the claims. As with the substitute specification filed August 8, 2002, no new matter is added by these amendments to the specification.

Additionally, proposed drawing amendments, and formal drawings, for Figures 3 and 8 are also provided so as to correspond Figures 3 and 8 with the amendments made to pages 11 and 18 of the substitute specification. The Examiner is respectfully requested to approve the proposed drawing amendments and accept the formal drawings.

With regard to the prior art rejections, Examiners Elkassabgi and Tamai explained how claims 9 and 21 were being read on JP '549. Also, though no specific claim language was agreed upon to define around the prior art references relied upon by the Examiner, Examiner Tamai expressed that in order to define a claim around these references this claim would have to recite at least one feature that is lacking from each of these references such that the claim would be prevented from being read on a combination of these references.

Accordingly, in order to further distinguish the instant invention from JP '549 and JP '170, either taken alone or in combination, claim 9 has been amended to recite that the caulked portion extends into the groove and is positioned such that defined in the end surface is

a recess which opens into said groove and does
not extend completely across said end surface

Such a feature is clearly shown in Figure 3, and is not taught by either one of JP '549 or JP '170.

In this regard, though the recess 7 of JP '549 can arguably be said to be in an end surface, JP '549 does not show the recess to open into the groove 6. Please see Figure 1 of JP '549, which shows the recess 7 to be delimited on four sides such that it does not open into the groove 6. This is contrary to what is recited in amended claim 9 and shown in Figure 3, wherein the recess opens into the groove 13.

Also, with regard to JP '170, while the recess resulting from the caulking operation thereof does open into the groove, this recess extends completely across the end surface in which it is defined. Please see Figure 4, for example. This is contrary to what is recited

in amended claim 9 and shown in Figure 3, wherein the recess does not extend completely across the end surface.

Accordingly, because claim 9 now recites a feature that is lacking from each of JP '549 and JP '170, any combination of these references would not result in the invention as now recited in claim 9. Thus, claim 9 and its dependent claims are allowable.

Attached hereto is a marked-up version of the pages of the specification and claims which changes have been made by the current Amendment. The attached pages are captioned **"Version With Markings To Show Changes Made."**

In view of the above amendments and remarks, it is respectfully submitted that the present application is in condition for allowance and an early Notice of Allowance is earnestly solicited.

If after reviewing this Amendment, the Examiner believes that any issues remain which must be resolved before the application can be passed to issue, the Examiner is invited to contact the Applicant's undersigned representative by telephone to resolve such issues.

Respectfully submitted,

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9. A vibration generating device for a small wireless machine,
comprising:

an eccentric load portion;

two side walls extending from said eccentric load portion, each of said two side walls having

(i) an inner surface, such that a groove having an open end and a bottom is defined between said inner surface of one of said two side walls and said inner surface of the other of said two side walls,

(ii) an outer surface,

(iii) an end surface interconnecting said inner surface and said outer surface and positioned at a level relative to the bottom of said groove, said end surface having a first end and a second end, and

(iv) a caulked portion extending into said groove from a location that is between said inner surface and said outer surface, and said caulked portion being positioned at a level that is closer to the bottom of said groove than is the level at which said end surface is positioned such that defined in said end surface is a recess which opens into said groove and does not extend completely across said end surface, whereby along an intersection of said end surface and said outer surface said end surface is continuous from said first end to said second end; and

a motor shaft positioned within said groove between said caulked portion of each of said two side walls and the bottom of said groove [such that said motor shaft is in its entirety between the bottom of said groove and said end surface,

wherein said caulked portions result from deforming respective portions of said two side walls from the open end of said groove toward the bottom of said groove such that said motor shaft is maintained in said groove via said caulked portions, whereby said motor shaft is integrally coupled to said eccentric load portion].

10. The vibration generating device according to claim 9, wherein [said caulked] [portion defines a recess in said end surface,] said recess [having] has a first side and a second side, with said first side being nearer to said inner surface than is said second side and with said second side being nearer to said outer surface than is said first side, and with said first side having a dimension extending in a direction from said first end of said end surface to said second end of said end surface that is greater than a dimension of said second side extending in a direction from said first end of said end surface to said second end of said end surface.

13. The vibration generating device according to claim [12] 11, wherein said motor shaft has a diameter, and wherein said inner surface is configured such that said groove includes a portion that surrounds said motor shaft for at least 180° of said motor shaft and such that the open end of said groove has a width that is from 70% to 95% of the diameter of said motor shaft.

16. The vibration generating device according to claim 15, wherein [said caulked] [portion defines a recess in said end surface,] said recess [having] has a first side and a second side, with said first side being nearer to said inner surface than is said second side and with said second side being nearer to said outer surface than is said first side, and with said first side having a dimension extending in a direction from said first end of said end surface to said second end of said end surface that is greater than a dimension of said second side extending in a direction from said first end of said end surface to said second end of said end surface.

18. The vibration generating device according to claim 15, wherein said end surface has a width dimension W extending from said inner surface to said outer surface, and said [caulked portion defines a] recess [in said end surface that] extends from said inner surface toward said outer surface a distance within a range of from $0.25W$ to $0.90W$.

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(B) is positioned such that defined in the end surface is a recess which opens into the groove and does not extend completely across the end surface, whereby along an intersection of the end surface and the outer surface the end surface is continuous from the first end to the second end as shown by the [0034] side portion 14b.

Then, in a tip portion end surface 14a of the side wall 14, at a central portion, but not at both end portions in the direction of the axial line O, a portion 14c, except at an outer peripheral side portion 14b of the side wall 14 and at the side 12 of the groove 13, is caulked by a rectangular parallelepiped caulking punch 15 from an opening side of the groove 13 to a bottom side thereof, so that the above vibrator 10 is integrally coupled to the rotating shaft 12. Here, in a width dimension W of the tip portion end surface 14a from the side of the groove portion 13 to an outer peripheral side, the portion 14c to be caulked at the side of the groove portion 13 is set in the range of $0.25W$ to $0.9W$ from the edge portion at the side of the groove 13.

[0035] (A) The rotating shaft 12 can be made of stainless steel, for example, SUS 420 or the like. The vibrator 10 is preferably molded by using an ultra heavy alloy material of a specific gravity of about 17 to 19 g/cm³, for example, W-Ni system, W-Ni-Fe system, W-Ni-Cu system, W-Mo-Ni-Fe system, or the like, and by performing a powder metallurgical technique. Specifically, a mixture powder of a composition made of W powder of 89 to 98 weight %, and Ni powder of 1.0 to 11 weight %, or a mixture powder of a composition containing the W powder and Ni powder in the above range of weight %, and one or more kinds of Cu of 0.1 to 6 weight %, Fe powder of 0.1 to 6 weight %, Mo powder of 0.1 to 6 weight %, and Co powder of 0.1 to 5 weight % is or are compacted into a fan plate shape by applying a pressure of 1 ton/cm² to 4 ton/cm². This compact is liquid phase sintered in a hydrogen gas stream having a dew point of 0°C to -6°C or in an ammonia decomposition gas, and thereafter, the compact is further heated in the temperature range of 700°C to 1430°C \pm 30°C in a vacuum, neutral or reducing atmosphere. Then, a heat treatment to rapidly cool the compact to at least 300°C at a cooling rate of 40°C/min or more is performed.

(A) In other words, as shown in Fig. 3, each side wall includes an inner surface 14d such that the groove 13 is defined between these inner surfaces; an outer surface 14e; the end surface 14a, which intersects the inner surface and the outer surface; and the side portion 14b having a first end 14f and a second end 14g; and the caulked portion 14c of the end surface 14a, which is positioned at a level that is higher than the level at which the end surface (B) is positioned.

[0051] FIGS. 8 and 9 show a vibrator 40 according to a fourth embodiment of the invention and its modified example, respectively. The vibrator 40 has substantially the same shape as that shown in the first embodiment, and the entirety of a fan-shaped portion that is eccentric from its axial line is an eccentric load portion 41. In the vibrator 40, a semicircular groove portion 43, in which a rotating shaft 42 of a motor is fit and which has a bottom portion with a size substantially equal to a diameter of the rotating shaft 42, is formed at the central portion of an outer peripheral arc which depicts the fan shape of the eccentric load portion 41. Side walls 44 extending from the eccentric load portion 41 in parallel with each other, and defining both side edge portions of the groove portion 43, are integrally formed at both side edge portions of the groove portion 43.

[0052] Then, in a tip portion end surface 44a of the side wall 44, and at the central portion thereof, but not at both end portions thereof, in an axial line direction, a portion 44c of the side wall 44, which does not include an outer peripheral side portion 44b of the side wall 44, at the side of the groove 43 is caulked by a cylindrical caulking punch 45 from an opening side of the groove portion 43 to a bottom side thereof, so that the above vibrator 40 is coupled to the rotating shaft 42. Here, as a result of caulking by the cylindrical caulking punch 45, concave caulked portions 44c formed at the tip portion end surfaces 44a, respectively, become substantially semi-circular, and are formed so that a length dimension L in the axial line direction at the side of the groove portion 43 becomes larger than a length dimension at an outer peripheral side of the concave caulked portions 44c. (i.e. a first side of a recess 44d defined by caulked portion 44c) (i.e. a second side of the recess 44d)

[0053] In a vibrator 40 shown in FIG. 9, at the central portion of a tip portion end surface 44a, a portion 44c' of a side wall 44, which does not include an outer